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DIGITAL BROADCAST RECEPTION METHOD

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DIGITAL BROADCAST RECEPTION METHOD

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Claims

1. A digital broadcast reception method characterized by the following facts:
the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting digital broadcast signal, receivers that receives said digital broadcast signal, and digital recorders connected to said receiver for recording/reproducing the program data associated with said digital broadcast signal, wherein,

* [The numbers in the right margin indicate pagination in Japanese text.]

said transmitting station generates recorder specifying information that specifies which of said digital recorders can record the prescribed program in the digital broadcast signal;

said transmitting station adds said recorder specifying information to the digital broadcast signal for transmission;

said recorder specifying information is extracted from the digital broadcast signal received by said receiver;

said recorder specifying information obtained by said receiver is compared with the individual information of said digital recorder;

and, as a result of said comparison, if said information agrees the program data is permitted to be output from said receiver to said digital recorder.

decision means

2. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, receivers that receive said digital broadcast signal, and digital recorders connected to said receivers for recording/reproducing the program data associated with said digital broadcast signal, wherein,

said transmitting station generates a reproducing receiver specifying information that specifies which of said receivers can reproduce the prescribed program in the digital broadcast signal;

said transmitting station adds said reproducing receiver specifying information to the digital broadcast signal for transmission;

when the program data of the digital broadcast signal received by said receiver is recorded by said digital recorder, said reproducing receiver specifying information extracted by said receiver is added to the program data, followed by output to said digital recorder;

when said receiver receives the program data from said digital recorder, it extracts said reproducing receiver specifying information from the reproduction data;

said extracted reproducing receiver specifying information compared with is the individual information of said receiver;

and, as a result of said comparison, if said information agrees, said receiver is permitted to play back the program data.

3. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting digital broadcast signal, receiver that receive said digital broadcast signal, and digital recorders connected to said receiver for recording/reproducing the program data associated with said digital broadcast signal, wherein,

said transmitting station generates reproduction permission information including the individual information of said receiver such that the program data can be reproduced from said digital recorder;

said transmitting station adds said reproduction permission information to the digital broadcast signal for transmission;

the program data and the reproduction permission information are extracted from the digital broadcast signal received by said receiver and recorded by said digital recorder; said digital recorder extracts said reproduction permission information from the reproduction data in the playback mode, and compares said reproduction permission information with the individual information of said receiver being connected;

and, as a result of said comparison, if the information agrees said digital recorder is permitted to output the program data to said receiver.

4. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, receivers that receive said digital broadcast signal, and digital recorders connected to said receiver for recording/reproducing the program data associated with said digital broadcast signal, wherein,

said transmitting station generates transmission specifying information that defines the characteristics of the receiver-digital recorder interface;

said transmitting station adds said transmission specifying information to the digital broadcast signal for transmission;

the program data and said transmission specifying information are extracted from the digital broadcast signal received by said receiver;

when said receiver records the program data in said digital recorder, said transmission specifying information is sent to said digital recorder and is recorded;

said digital recorder extracts said transmission specifying information and the transmission specifying information of said receiver from the reproduced data in the playback mode;

said digital recorder compares said extracted transmission specifying information with the transmission specifying information of said receiver being connected;

and, as a result of said comparison, if said information agrees said digital recorder is permitted to output the program data to said receiver.

5. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting digital broadcast signal, receivers that receive

said digital broadcast signal, and digital recorders connected to said receivers for recording/reproducing the program data associated with said digital broadcast signal; wherein,

said transmitting station generates transmission specifying information that defines the characteristics of the receiver-digital recorder interface;

said transmitting station adds said transmission specifying information to the digital broadcast signal for transmission;

the program data and said transmission specifying information are extracted from the digital broadcast signal received by said receiver;

when said receiver records said program data in said digital recorder, said transmission specifying information is sent to said digital recorder and is recorded;

when said receiver extracted the program data from said digital recorder, said receiver extracts said transmission specifying information from said the reproduced data;

said receiver compares said extracted transmission specifying information with the transmission specifying information of the digital recorder being connected;

and, as a result said comparison, if said information agrees said receiver is permitted to extract the program data from said digital recorder.

6. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, receivers that receive said digital broadcast signal, and digital recorders connected to said receivers and recording/reproducing the program data associated with said digital broadcast signal; wherein,

said transmitting station generates reproduction permission information such that said receiver can reproduce the program data from said digital recorder;

said transmitting station adds said reproduction permission information to the digital broadcast signal for transmission;

the program data and said reproduction permission information are extracted from the digital broadcast signal received by said receiver, and the program data is scrambled and recorded in said digital recorder;

when said receiver extracts the program data from said digital recorder, if there is said reproduction permission information, the reproduction data of said digital recorder is descrambled and the program data is output.

7. A digital broadcast reception method characterized by the following facts:

the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station that scrambles and transmits a digital broadcast signal, receivers that receive said digital broadcast signal, and digital recorders connected to said

receivers for recording/reproducing the program data associated with said digital broadcast signal;

when said receiver receives the digital broadcast signal, it generates a descrambler history that identifies whether descrambling has been performed;

when said receiver records the program data in said digital recorder, said descrambler history is added to a scrambled or unscrambled program data, and is sent to said digital recorder for recording;

when said receiver extracts the program data from said digital recorder, if the descrambler history in the reproduction data is extracted and its contents are descrambled, control is performed such that the user pays a prescribed fee.

8. The digital broadcast reception method described in Claims 1-7 characterized by the fact that said receiver and said digital recorder are connected by means of as IEEE 1394 bus.

9. The digital broadcast reception method described in Claim 8 characterized by the fact that the IEEE 1394 bus contains the serial number of the bus or the manufacturer's codes of said receiver and said digital recorder.

10. The digital broadcast reception method described in Claim 1 characterized by the fact that

said recorder specifying information obtained in said receiver is compared with the individual information of said digital recorder, and

control is performed such that when the information is not in agreement but a prescribed fee has been paid to said transmitting station, recording of the program data is permitted.

11. The digital broadcast reception method described in Claim 2 characterized by the fact that

said reproducing receiver specifying information extracted from the reproduction data of said digital recorder is compared with the individual information of said receiver, and

control is performed such that if the information is not in agreement but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

12. The digital broadcast reception method described in Claim 3 characterized by the fact that

when said receiver takes out the program data from said digital recorder, said digital recorder compares said extracted reproduction permission information with the individual information of said receiver being connected, and

control is performed such that if the information is not in agreement but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

13. The digital broadcast reception method described in Claim 4 characterized by the fact that

when said receiver extracts the program data from said digital recorder, said digital recorder extracts the transmission specifying information and the transmission specifying information [sic] of said receiver from the reproduction data,

said recorder specifying information extracted by said digital recorder is compared with the transmission specifying information of said receiver being connected, and

control is performed such that if the information is not in agreement but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

14. The digital broadcast reception method described in Claim 5 characterized by the fact that

when said receiver extracts the program data from said digital recorder, said receiver extracts the transmission characteristics information and the transmission specifying information of said digital recorder from the reproduction data;

said receiver compares said extracted transmission specifying information with the transmission specifying information of the digital recorder being connected; and

control is performed such that if the information is not in agreement but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

15. The digital broadcast reception method described in Claim 6 characterized by the fact that

when said receiver extracts the program data from said digital recorder,

control is performed such that even if there is no said reproduction permission information but a prescribed fee has been paid to said transmitting station, said receiver can descramble the reproduction data of said digital recorder and output the program data.

Detailed explanation of the invention

[0001]

Technical field of the invention

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The present invention pertains to a digital broadcast reception method characterized by the fact that the system is mainly composed of a transmitting station, a receiver and a recorder, and it is especially used in defining the signal that allows transmission, recording and reproduction, as well as the transmission channel.

[0002]

Prior art

In the digital broadcast reception method, plural channels of video, audio and text signals are multiplexed, and the information is converted into a broadcast signal in the form of digital data and is broadcast via satellite, ground waves, CATV or another transmission medium so that

said information is provided to general customers and licensed customers. Figures 15 and 16 illustrate an example of the constitution of the system that have been proposed in the prior art.

[0003]

As shown in Figure 15, in transmitting station (1), plural channels of video, audio and text data are multiplexed and are converted into digital broadcast signals for transmission. Transmitting station (1) is composed of controller (4), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), modulating/transmitting unit (11).

[0004]

As shown in Figure 16, receiver (2) receives the digital broadcast signal sent from transmitting station (1) via satellite, ground waves, CATV, or another transmission medium, and it is sent to general customers or licensed customers. Receiver (2) is composed of receiving/modulation unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), comparator (27), controller (28), audio decoder (29), video decoder (30), text decoder (31), and digital interface (32).

[0005]

Recorder (3) in Figure 15 records the program data received by receiver (2) in a recording medium, and it reproduces the recorded program data. Digital interface (41) is set in recorder (3).

[0006]

In the following, the operation of the digital broadcast reception method with the aforementioned constitution will be examined. In transmitting station (1), when controller (4) starts operating, the digital information of the program to be transmitted is read from TV signal server (6) that stores the program data. Viewing/listening permission information generator (7) generates the viewing/listening permission information, a signal that indicates whether viewing/listening is permitted for each user. Most of the programs are pay-per-view, and they are demodulated only at homes of licensed customers. Then, a fee is collected corresponding to the type and value of the program.

[0007]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to each

program corresponding to the ID of each user stored in controller (4). Packet forming unit (9) inserts the viewing/listening permission information into a prescribed packet and outputs it to multiplexer (10). Scrambler (8) scrambles the digital information from TV signal server (6) when the program is a pay type.

[0008]

In this case, as far as scrambling is concerned, there are the following keys: a first key that decodes the scrambling itself, a key (second key) for the information that specifies the packet with said first key contained in it, and a third key that scrambles the first key. Said first through third keys as well as the viewing/listening permission information, etc. are generated in the form of prescribed MPEG signals known as ECM, EMM. With a command from controller (4), multiplexer (10) multiplexes the table information for specifying the packets of the various programs generated in MPEG form, the information pertaining to said scramble keys (first through third keys), and the information containing the viewing/listening permission information, and converts them into a digital broadcast signal. Also, multiplexer (10) may perform multiplexing for the packet of plural programs. The multiplexed digital broadcast signal is output to modulating/transmitting unit (11), and it is modulated and broadcast or transmitted corresponding to the prescribed transmission medium, such as satellite transmission, ground waves, CATV, etc.

[0009]

In the following, the operation of receiver (2) will be examined. The digital broadcast signal received through a cable or an antenna is demodulated by receiving/demodulating unit (21). On the other hand, controller (28) extracts the table information that is not scrambled from receiving/demodulating unit (21). This table information is to let users know the information about the programs in the digital broadcast signal. When the user selects a program, descrambler (23) decodes the scramble key by means of the individual information recorded in the IC card or other individual information memory (26) in the receiver and the portion of the viewing/listening permission information corresponding to the user. Then, the obtained scramble key is used to decode the scramble of the digital broadcast signal of the selected program.

[0010]

When there exists fee information for viewing or listening in the viewing/listening permission information, the fee is displayed along with the program shown to the user. When the user does not select viewing/listening, the descrambling operation is not performed. When the user selects viewing/listening, the descrambling operation is carried out, and the fee charged for

the viewing/listening is added to a prescribed region of individual information memory (26). The information concerning the charged fee in individual memory (26) is regularly uploaded to transmitting station (1) through modem (25) and modem (5).

[0011]

With the obtained table information, controller (28) sends a command pertaining to selection of the packet of the digital broadcast signal to descrambler (24). Upon receiving this command, descrambler (24) disassembles the packet form, while it sends the bit stream of the audio data to audio decoder (29), the bit stream of the video data to video decoder (30), and the bit stream of the text data to text decoder (31). Said decoders (29)-(31) decode the respective data and regenerate the contents of the program on the monitor (not shown in the figure).

[0012]

A method for recording programs is described below. In order to view from the signal after descrambling by the descrambler (24), the packet of the selected program is assigned by controller (28); the assigned packet is selected by descrambler, and it is output to digital interface (32). In this method, all of the recorded packets are recorded by means of recorder (3) in a form that allows decoding of the scramble.

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[0013]

Digital interface (32) of receiver (2) converts and outputs the data with a prescribed transmission form for the packet sent from demultiplexer (24). Digital interface (41) of recorder (3) then converts the transmission form back to the packet in the original form, and outputs it to a recording equipment contained in recorder (3). In this way, the packet to be recorded is received through digital interfaces (32), (41), and the data is recorded in a prescribed format by the recording equipment.

[0014]

In the following, let's look briefly at the reproduction operation of recorder (3). In playback mode, the timing input to the recording equipment is recovered, and the packets are reproduced and sent to digital interface (41). Receiver (2) receives reproduced packet through digital interface (32), and the packet is sent to demultiplexer (24). In the same sequence as that in the aforementioned case of direct reception from transmitting station (1), controller (28) sends a command to demultiplexer (24) so that the packet of the digital broadcast signal is selected by means of the table information. According to this command, demultiplexer (24) disassembles the data in the packet form, while the bit stream of the data is sent to audio decoder (29), video

decoder (30), and text decoder (31). Said decoders (29)-(31) decode the data and reproduce the program contents.

[0015]

Problems to be solved by the invention

However, the aforementioned conventional digital broadcast reception method has the following disadvantages. When a broadcast program is recorded on a recorder, the charging of fees and disabling of copying of pay-per-view programs cannot be carried out appropriately. For example, since the packets are all recorded by recorder (3) in descrambled form, once recorded, the program can be viewed any number of times. In addition, it is possible to copy and redistribute the program. The broadcast programs are limited to digital programs, and there is no degradation of the data even when recording/reproduction are performed repeatedly. This infringes the rights of the copyright-holder of the program data. In addition, the transmitting station has no way to assess fees when recorded programs are reproduced repeatedly, which is also undesired.

[0016]

The purpose of the present invention is to solve the aforementioned problems of the conventional methods by providing a method characterized by the fact that for a pay-per-view program, the user cannot record the program data in the recorder, or, even if the program data is recorded, it is as impossible to reproduce the recorded data as it is to view/listen to the program. In addition, in order to protect the rights of the owner of the copyright of the program data, when a user makes use of a receiver to reproduce the program data, the transmitting station can charge him/her a fee in this digital broadcast reception method.

[0017]

Means for solving the problems

In order to solve the aforementioned problems, the invention as described in Claim 1 of the present patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates recorder specifying information that specifies which digital recorder can record the prescribed program in the digital broadcast signal; said transmitting station adds said recorder specifying information to the digital broadcast signal

for transmission; said recorder specifying information is extracted from the digital broadcast signal received by said receiver; said recorder specifying information obtained by said receiver is compared with the individual information of said digital recorder; and as a result of said comparison, if said information agrees, the program data is permitted to be output from said receiver to said digital recorder.

[0018]

In this method, when the recorder specifying information sent from the transmitting station and the information specifying the recorder connected to the receiver agree, recording of the program data is permitted. On the other hand, when the specifying information is not in agreement, only viewing/listening of the program using the receiver is permitted. The fee for the program recording is stored in the individual information memory, and the data is uploaded to the transmitting station.

[0019]

The invention as described in Claim 2 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used in a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates a reproducing receiver specifying information that specifies which receiver can reproduce the prescribed program in the digital broadcast signal; said transmitting station adds said reproducing receiver specifying information to the digital broadcast signal for transmission; when the program data of the digital broadcast signal received by said receiver is recorded by said digital recorder, said reproducing receiver specifying information extracted by said receiver is added to the program data, followed by output to said digital recorder; when said receiver receives the program data from said digital recorder, it extracts said reproducing receiver specifying information from the reproduction data; said extracted reproducing receiver specifying information is compared with the individual information of said receiver; and, as a result of said comparison, if said information agrees said receiver is permitted to reproduce the program data.

[0020]

In this method, when the reproducing receiver specifying information sent from the transmitting station is in agreement with the information specifying the receiver used in

reproduction of the program, reproduction of the program data is permitted. On the other hand, when the specifying information is not in agreement, only viewing/listening of the program using the receiver is permitted. The fee for the program reproduction is stored in the individual information memory, and the data is uploaded to the transmitting station.

[0021]

The invention as described in Claim 3 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates reproduction permission information including the individual information of said receiver such that the program data can be reproduced from said digital recorder; said transmitting station adds said reproduction permission information to the digital broadcast signal for transmission; the program data and the reproduction permission information are extracted from the digital broadcast signal received by said receiver and recorded by said digital recorder; said digital recorder extracts said reproduction permission information from the reproduction data in the playback mode, and compares said reproduction permission information with the individual information of said receiver being connected; and, as a result of said comparison, if the information data are in agreement with each other, it is permitted that said digital recorder outputs the program data to said receiver.

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[0022]

In this method, when reproduction permission information is sent from the transmitting station, if the information for specifying the receiver used in recording the program and the information for specifying the receiver used in reproducing of the program agree, reproduction of the program data is permitted. On the other hand, if the specifying information does not agree, it is only permitted that the receiver can view or listen to the program. The fee for the program reproduction is recorded in the individual information memory, and the data is uploaded to the transmitting station.

[0023]

The invention as described in Claim 4 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for

transmitting a digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates a transmission specifying information that defines the characteristics of interface between said receiver and said digital recorder; said transmitting station adds said transmission specifying information to the digital broadcast signal for transmission; the program data and said transmission specifying information are extracted from the digital broadcast signal received by said receiver; when said receiver records the program data in said digital recorder, said transmission specifying information is sent to said digital recorder and is recorded; said digital recorder extracts said transmission specifying information and the transmission specifying information of said receiver from the reproduction data in the playback mode; said digital recorder compares said extracted transmission specifying information with the transmission specifying information of said receiver being connected; and as a result of said comparison, if said information agrees said digital recorder is permitted to output the program data to said receiver.

[0024]

In this method, when the transmission specifying information is sent from the transmitting station, if the information for specifying the receiver used in recording of the program and the information in specifying the recorder used in reproduction of the program agree the recorder permits the receiver to reproduce the program data. If the specifying information does not agree, the receiver is only permitted to view/listen the program. The fee for program reproduction is stored in the individual information memory, and the data is uploaded to the transmitting station.

[0025]

The invention as described in Claim 5 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting a digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates transmission specifying information that defines the characteristics of interface between said receiver and said digital recorder; said transmitting station adds said transmission specifying information to the digital broadcast signal for transmission; the program data and said transmission specifying information are extracted from the digital broadcast signal received by

said receiver; when said receiver records said program data in said digital recorder, said transmission specifying information is sent to said digital recorder and is recorded; when said receiver extracts the program data from said digital recorder, said receiver extracts said transmission specifying information from said the reproduced data; said receiver compares said extracted transmission specifying information with the transmission specifying information of the digital recorder being connected; and, as a result said comparison, if said information agrees said receiver is permitted to extract the program data from said digital recorder.

[0026]

In this method, when the transmission specifying information is sent from the transmitting station, if the information for specifying the receiver used in recording of the in agree with the information for specifying the recorder used in reproduction of the program, the receiver is permitted to reproduce the recorded program data. On the other hand, if the specifying information does not agree the receiver is only permitted to view or listen to the program. The fee for program reproduction is recorded in the individual information memory, and the data is uploaded to the transmitting station.

[0027]

The invention described as in Claim 6 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station for transmitting digital broadcast signal, a receiver that receives said a digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; in this digital broadcast reception method, said transmitting station generates a reproduction permission information such that said receiver can reproduce the program data from said digital recorder; said transmitting station adds said reproduction permission information to the digital broadcast signal for transmission; the program data and said reproduction permission information are taken out from the digital broadcast signal received by said receiver, and the program data is scrambled and recorded in said digital recorder; when said receiver takes out the program data from said digital recorder, if there is said reproduction permission information, the reproduction data of said digital recorder is descrambled and the program data is output.

[0028]

In this method, when a program is recorded, the program data is scrambled and recorded in the recorder. When the program data is taken out from the recorder, if the reproduction

permission information is sent from the transmitting station, the reproduction data can be descrambled. Even when there is no reproduction permission information, the receiver still can perform viewing/listening of the program. The fee for the program reproduction is stored in the individual information memory, and the data is uploaded to the transmitting station. /7

[0029]

The invention as described in Claim 7 of this patent application provides a digital broadcast reception method characterized by the following facts: the digital broadcast reception method is used by a digital broadcast reception system comprising a transmitting station that scrambles and transmits a digital broadcast signal, a receiver that receives said digital broadcast signal, and a digital recorder that is connected to said receiver and records/reproduces the program data of said digital broadcast signal; when said receiver receives the digital broadcast signal, it generates a descrambler history that identifies whether descrambling has been performed; when said receiver records the program data in said digital recorder, said descrambler history is added to a scrambled or unscrambled program data, and is sent to said digital recorder for recording; when said receiver takes out the program data from said digital recorder, if the descrambler history in the reproduction data is extracted and its contents are descrambled, control is performed such that the user pays a prescribed fee.

[0030]

In this method, when the data of the transmission program is descrambled, whether or not it is scrambled is recorded as a descrambler history together with the program data in the recorder. When the program data is extracted from the recorder, if the descrambler history indicates scrambling, the fee for program reproduction is stored in the individual information memory, and the data is uploaded to the transmitting station.

[0031]

The invention as described in Claim 8 of this patent application pertains to the fact that said receiver and said digital recorder are connected by means of an IEEE 1394 bus.

[0032]

The invention as described in Claim 9 of this patent application pertains to the fact that the IEEE 1394 bus contains the serial number of the bus or the manufacturer's codes of said receiver and said digital recorder.

[0033]

With these methods, it is possible to transfer program data at a high bit rate between the receiver and the recorder. Also, it is possible to insert various specifying information data either asynchronously or synchronously to the program data.

[0034]

The invention as described in Claim 10 of this patent application pertains to the fact that said recorder specifying information obtained in said receiver is compared with the individual information of said digital recorder, and control is performed such that when the information does not agree but a prescribed fee has been paid to said transmitting station, recording of the program data is permitted.

[0035]

The invention as described in Claim 11 of this patent application pertains to the fact that said reproducing receiver specifying information extracted from the reproduction data of said digital recorder is compared with the individual information of said receiver, and control is performed such that if the information does not agree but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

[0036]

The invention as described in Claim 12 of this patent application pertains to the fact that when said receiver extracts the program data from said digital recorder, said digital recorder compares said extracted reproduction permission information with the individual information of said receiver being connected, and control is performed such that if the information does not agree but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

[0037]

The invention as described in Claim 13 of this patent application pertains to the fact that when said receiver extracts the program data from said digital recorder, said digital recorder extracts the transmission specifying information and the transmission specifying information of said receiver from the reproduction data, said recorder specifying information extracted by said digital recorder is compared with the transmission specifying information of said receiver being connected, and control is performed such that if the information does not agree but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

[0038]

The invention as described in Claim 14 of this patent application pertains to the fact that when said receiver extracts the program data from said digital recorder, said receiver extracts the transmission characteristics information and the transmission specifying information of said digital recorder from the reproduction data; said receiver compares said extracted transmission specifying information with the transmission specifying information of the digital recorder being connected; and control is performed such that if the information does not agree but a prescribed fee has been paid to said transmitting station, reproduction of the program data is permitted.

[0039]

The invention as described in Claim 15 of this patent application pertains to the fact that when said receiver extracts the program data from said digital recorder, control is performed such that even if there is no said reproduction permission information but a prescribed fee has been paid to said transmitting station, said receiver can descramble the reproduction data of said digital recorder and output the program data.

[0040]

By means of the aforementioned methods, it is possible to permit recording/reproduction of the program data if an additional fee has been paid, even when the various specifying information between the transmitting station and the receiver or between the receiver and the recorder does not agree.

[0041]

Embodiment of the invention

Embodiment 1

In the following, let's look at the digital broadcast reception method in the first embodiment of the present invention with reference to Figures 1 and 2. Figure 1 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in this embodiment. Figure 2 is a block diagram illustrating the constitution of the receiver. In these figures, the same part numbers as those in the prior art shown in Figures 15 and 16 are adopted, and they will not be explained again in detail.

[0042]

As shown in Figure 1, transmitting station (1A) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to the user having a receiver. As in the prior art, transmitting station (1A) has controller (4A), modem

(5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), and modulating/transmitting unit (11). In addition, recorder specifying information generator (12) is set in transmitting station (1A) in this embodiment.

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[0043]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fee pertaining to recording stored in controller (4A). Recorder specifying information generator (12) generates the recorder specifying information that specifies the recorder that can record programs. This information is sent to packet forming unit (9), and it is inserted into a prescribed packet.

[0044]

As shown in Figure 2, receiver (2A) receives the digital broadcast signal broadcast from transmitting station (1A) via satellite, ground waves, CATV, or another transmission medium, and it is sent to the site of the customer licensed with the program service. As in the prior art, receiver (2A) also has receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), comparator (27), controller (28A), audio decoder (29), video decoder (30), text decoder (31), and digital interface (32A).

[0045]

While the program data is transferred from modulating/transmitting unit (11) to receiving/demodulating unit (21) by means of the digital broadcast signal, the recording fee information is transferred between modems (5) and (25). Modem (25) is a modem contained in, e.g., a personal computer, and, as required, it is connected to modem (5) of transmitting station (1A) by means of connection to a the telephone line.

[0046]

This embodiment differs from the prior art in that it has recording permission information extractor (33) and recording fee information generator (34A) in receiver (2A). When recording permission information extractor (33) selects the program that the user wants to record, the recording permission information is extracted from the data output from descrambler (23), and it is sent to comparator (27). Recording fee information generator (34A) extracts the recording fee information from the data of digital interface (32A), and adds it to the prescribed region of individual information memory (26).

[0047]

As shown in Figure 1, recorder (3A) is a device that records the program data received by receiver (2A) in a recording medium and reproduces the program data. Recorder (3A) has recording equipment that records/reproduces the information in a recording medium and digital interface (41A).

[0048]

In recent years, the IEEE 1394 bus has been proposed as an interface for high-speed transmission. IEEE 1394 is an upgrade of the SCSI connected between the personal computer (computer) and the peripheral equipment via a cable. Here, the peripheral equipment refers not only to a hard disk device, but also to a video camera, digital VTR, color printer, etc. The data transfer rate for each link may be 100, 200 or 400 Mbps. This rate is higher than that of a conventional interface. In addition, there is no need to set plural cables in a number equal to that of the peripheral equipment for connecting between the main body of the personal computer and the peripheral equipment. Instead, one may use a common connection cable.

[0049]

Based on the aforementioned characteristic features, let's look at IEEE 1394 bus as an interface for data transfer between receiver (2) and recorder (3). This interface can be used to specify the communication partners, like SCSI, etc., by means of the serial number or manufacturer's code for each interface. Also, this interface allows transfer of data that does not specify the transmission destination as a broadcast transmission.

[0050]

Also, the IEEE 1394 bus can perform asynchronous communication and isochronous communication, which performs transmission with a constant delay in transmission/reception and with a prescribed band guaranteed, at the same time. On the basis of these characteristics, it is possible to transmit signals that have strict arrival time requirements, such as MPEG signals, and for transmission of commands and annexed data between equipment at the same time. Consequently, people have concentrated their attention on the interface appropriate for transmission of video data and audio data of digital broadcast, etc. Digital interface (32A) of receiver (2A) and digital interface (41A) of recorder (3) are connected by means of said IEEE 1394 bus.

[0051]

Let's look at the operation of the digital broadcast reception method in the first embodiment with said constitution. In transmitting station (1A), controller (4A) reads the program data to be transmitted from TV signal server (6) that has plural programs stored in it. Viewing/listening permission information generator (7) sets the method for charging fee corresponding to the type and value of the program. Then, it generates the signal that indicates whether viewing/listening is permitted from each user on the basis of the license with the user, the viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and the program stored in controller (4A), and the fee charged for recording. Recorder specifying information generator (12) generates the recorder specifying information as information for specifying recorder (3A) that can record the program.

[0052]

For example, the user registers recorder (3A) connected to receiver (2A) with controller (4A) of the transmitting station via modems (25), (5). Then, the ID of each user, the type and ID of connected recorder (3A), and recording permission pertaining to the program on the basis of the license stored in controller (4A) are handled as recording permission information. Then, scrambler (8) scrambles the data of the pay programs. In this case, the viewing/listening permission information, the key for decoding the scrambled information, the information that specifies the packet of the key, the descrambling key, etc. are generated in the form of prescribed MPEG signals known as ECM and EMM.

[0053]

Also, the generated recording permission information is converted by packet forming unit (9) into a packet form that can be multiplexed to MPEG signal, such as a private data packet form, and it is multiplexed by multiplexer (10). In this case, the table information for specifying the packets of various programs generated in MPEG form, the information of said scramble key, etc., and the information containing the viewing/listening permission information are also multiplexed at the same time. Also, multiplexer (10) may multiplex packets of plural programs. The multiplexed digital broadcast signal is modulated and transmitted by modulating/transmitting unit (11) using a prescribed method corresponding to the transmission medium, such as transmission via satellite, ground waves, CATV, etc.

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[0054]

In receiver (2A), the received digital broadcast signal is demodulated by receiving/demodulating unit (21), and the table information is extracted by controller (28A).

From the table information, the user can get the information pertaining to the programs. The process of decoding the digital broadcast signal directly transmitted from transmitting station (1A) to receiver (2A) is the same as that of the prior art.

[0055]

When the user selects the program to be recorded, recording permission information extractor (33) extracts the recording permission information from the received data. Comparator (27) compares the data of the corresponding portions on the basis of the recording permission information of recording permission information extractor (33), the individual information of recorder (3A) recorded in individual information memory (26) of the IC card owned by the user, and the program or channel indicated by controller (28A).

[0056]

As a result of the comparison, when the recording of the program contents is permitted, controller (28A) prohibits output to digital interface (32A) with respect to demultiplexer (24). When recording is permitted as a result of the comparison, the amount of the fee required for recording the program is displayed to the user on the basis of the fee of recording in the viewing/listening permission information read by controller (28A). When the user decides to record the program, recording fee information generator (34A) generates the recording fee information, and adds it to the prescribed region of individual information memory (26). The recording fee information in individual information memory (26) is regularly uploaded to transmitting station (1A) through modem (25) together with the fee information for viewing/listening.

[0057]

If the user did not select recording of the program, recording fee information generator (34A) does not operate, and recording of the program is not carried out. When there is no fee information in the digital broadcast signal, said operation is not carried out, and the next operation is carried out directly. That is, when controller (28A) assigns the packet of the program for recording on the basis of the table information, demultiplexer (24) selects the assigned packet, and the data of the program is output to digital interface (32A).

[0058]

As explained above, in the digital broadcast reception method of this embodiment, it is possible to perform permission management for recording and fee management in a safe and strict way. Thus, the program for direct viewing/listening and the program for recording can be

managed independently of each other, and it is also possible to record one program while watching another. Also, it is possible to output the packet for recording to recorder (3A) in a form with descrambling corresponding to the assignment, or in scrambled form as is.

[0059]

Embodiment 2

In the following, let's look at the digital broadcast reception method in the second embodiment of the present invention with reference to Figures 3 and 4. Figure 2 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of this embodiment. Figure 4 is a block diagram illustrating the constitution of the receiver. The same part numbers as those in the system of the first embodiment will be adopted here, and they are not to be explained again in detail.

[0060]

As shown in Figure 3, transmitting station (1B) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to a user with a receiver. As in the prior art, transmitting station (1B) comprises controller (4B), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), and modulating/transmitting unit (11). In addition, reproducing receiver specifying information generator (13) is set in transmitting station (1B) of this embodiment.

[0061]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fee pertaining to recording stored in controller (4B). Said reproducing receiver specifying information generator (13) generates the reproducing receiver specifying information, information for specifying the receiver that can reproduce programs. Such information is sent to packet forming unit (9), and it is inserted into a prescribed packet.

[0062]

Receiver (2B) receives the digital broadcast signal broadcast from transmitting station (1A) via satellite broadcasting, ground wave, CATV, or other transmission medium, and it is set at the site of the customer licensed with the program service. As in the prior art, receiver (2B) also comprises receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information

memory (26), comparator (27), controller (28B), audio decoder (29), video decoder (30), text decoder (31), and digital interface (32B).

[0063]

This embodiment differs from the prior art in that its receiver (2B) has reproducing receiver specifying information extractor (35) and recording fee information generator (34B). Reproducing receiver specifying information extractor (35) extracts the reproducing receiver specifying information from the data output from descrambler (23), and it is sent to comparator (27). This reproducing receiver specifying information sends the right to reproduce a prescribed program from the reproduction packet to receiver (2B) when a reproduction packet is received from recorder (3B) via digital interface (32B). Recording fee information generator (34B) extracts the recording fee information from the data of digital interface (32B) and adds it to the prescribed region of individual information memory (26).

[0064]

Let's look at the operation of the digital broadcast reception method in the second embodiment with said constitution. In transmitting station (1B), controller (4B) reads the data of the program to be transmitted from TV signal server (6) that has plural programs stored in it. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the license of each user according to the method for charging fee corresponding to the type and value of the program concerned.

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[0065]

At the same time, reproducing receiver specifying information generator (13) receives the reproduction data from recorder (3B) that has recorded the program, and generates a reproducing receiver specifying information, information for specifying receiver (2B) that allows reproduction. For example, the user has an ID in a form corresponding to receiver (2B), and the ID of each user, the viewing/listening permission pertaining to the program based on the license, and the reproduction permission information that indicates permission of reproduction that are stored in controller (4B) are sent to packet forming unit (9).

[0066]

Also, scrambler (8) scrambles the program data when the program is a pay-per-view program. In the case, the viewing/listening permission information, the key that decodes the

scramble, the key for the information that specifies the key packet, the descrambling key, etc., are generated in the form of a prescribed MPEG signal known as ECM, EMM.

[0067]

Also, the generated reproduction permission information is converted into a packet form that can be multiplexed to MPEG signal by means of packet forming unit (9), e.g., a private packet form. Then, it is multiplexed in the digital broadcast signal by means of multiplexer (10). In this case, the table information for specifying the packet of each program generated in MPEG form, as well as said scramble key and other information, and viewing/listening permission information, etc. are also multiplexed at the same time. Also, multiplexer (10) may multiplex the packets of plural programs.

[0068]

Modulating/transmitting unit (11) the multiplexed data converts by into a digital broadcast signal that can be transmitted to receiver (2B) using a prescribed method corresponding to the type of transmission, such as satellite, ground waves, CATV, etc. In receiver (2B), the received digital broadcast signal is demodulated by receiving/demodulating unit (21), the table information is extracted from the received signal by controller (28B), and the information pertaining to the program is displayed to the user. The process of decoding the prescribed program from the directly transmitted digital broadcast signal from transmitting station (1B) to receiver (2B) is the same as that of the prior art and the first embodiment.

[0069]

In receiver (2B), based on the recording fee information in the viewing/listening permission information read by viewing/listening permission information extractor (22), the fee required for recording the program is displayed to the user. When the user decides to record the program, the recording fee information generator (34B) generates the recording fee information, and adds it in the prescribed region of individual information memory (26). The recording fee information in individual information memory (26) is regularly uploaded to transmitting station (1B) via modem (25) together with the fee information for viewing/listening. If the user does not decide to record the program, recording fee information generator (34B) does not operate, and the program is not recorded. When there is no fee information, the operation is not carried out but the next operation is.

[0070]

In recording mode, the packet of the selected program for recording is assigned by controller (28B). Then, the assigned packet is selected by demultiplexer (24), and the program data is output to digital interface (32B). Also, the packet for recording can be recorded in recorder (3B) in scrambled or descrambled form, depending on the assignment.

[0071]

Digital interface (32B) converts the packet sent from demultiplexer (24) into the prescribed transmission form, and outputs it to recorder (3B). In this case, data transmission between digital interfaces (32B) and (41B) is carried out by means of IEEE 1394 bus. Digital interface (41B) converts the packet from the transmission form back into the original form and outputs it to incorporated recording equipment. The recording equipment that receives the packet to be recorded records the packet in a prescribed format in a recording medium.

[0072]

When the user selects reproduction of the program from recorder (3B), the recording equipment recovers the timing input in recording, and the various packets are reproduced and sent to digital interface (32B). Here, the reproduced packet is output to reproducing receiver specifying information extractor (35). Reproducing receiver specifying information extractor (35) extracts the reproducing receiver specifying information, and comparator (27) compares it with the individual information stored in IC card or other individual information memory (26) and the corresponding portion of the extracted reproduction permission information.

[0073]

When reproduction of program from recorder (3B) is permitted as a result of said comparison, the packet is sent to demultiplexer (24). Controller (28B) assigns the packet of the program recorded by means of the table information, and demultiplexer (19) selects the assigned packet, and outputs it to digital interface (32B). When reproduction is not permitted, controller (28B) prohibits output of the program data to interface (32B) with respect to multiplexer (24).

[0074]

In this embodiment, by means of a combination of fee management in recording and permission in reproduction, it is possible to manage programs in a safe and strict way. In particular, instead of specifying recorder (3B) that records the program data, receiver (2B) or IC card that can be reproduced is limited, and it is possible to reduce the recording restriction on the user. That is, it is possible to adopt a method in which after the program is recorded, a

reproduction permission is obtained, and the contents of individual information memory (26) inside the IC card are refreshed. Also, it is possible independently to manage the programs for direct viewing/listening and the programs for recording, and it is possible to record one program while watching another program. In addition, this embodiment is not limited to recording, it may also be used for managing reproduction fees.

[0075]

Embodiment 3

In the following, let's look at the digital broadcast reception method in the third embodiment of the present invention with reference to Figures 5 and 6. Figure 5 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of this embodiment. Figure 6 is a block diagram illustrating the constitution of the receiver. The same part numbers were used in the system of the first embodiment are used here and their explanation will not be repeated.

[0076]

As shown in Figure 5, transmitting station (1C) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to the user having a receiver. As in the prior art, transmitting station (1C) has controller (4C), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), and modulating/transmitting unit (11). In addition, reproducing permission information generator (14) is set in transmitting station (1C) of this embodiment.

[0077]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fee pertaining to recording stored in controller (4C). Said reproduction permission information generator (14) receives the reproduction data from recorder (3C) with the program recorded in it, and generates the reproduction permission information for receiver (2C). This information is sent to packet forming unit (9) and is inserted into a prescribed packet.

[0078]

Receiver (2C) receives the digital broadcast signal broadcast from transmitting station (1C) via satellite, ground waves, CATV, or another transmission medium, and it is sent to the

customer licensed to receive the program service. As in the first embodiment, receiver (2C) also has receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), controller (28C), audio decoder (29), video decoder (30), text decoder (31), digital interface (32C), and recording fee information generator (34C).

[0079]

This embodiment differs from the first and second embodiments in that the digital interface (32C) contains ID transmitter (32c). Digital interface (32C) outputs the program data, and, at the same time, outputs the individual information recorded in individual information memory (26) to recorder (3C). In this case, ID transmitter (32c) converts said individual information into a prescribed transmission format. Recording fee information generator (34C) extracts the recording fee information from the data of digital interface (32C) and adds it to the prescribed region of individual information memory (26).

[0080]

Recorder (3C) records the program data received by receiver (2C) in a recording medium, and it can also reproduce the recorded data. Recorder (3C) has digital interface (41C) that contains ID receiver (41c), as well as reproduction permission information extractor (43), and controller (44). Digital interface (32C) of receiver (2C) and digital interface (41C) of recorder (3C) are connected by means of IEEE 1394 bus.

[0081]

Digital interface (41C) recovers the timing input to the recording equipment, and at the same time reproduces the data for each packet. With the command from controller (44), reproduction permission information extractor (43) extracts the reproduction permission information from the reproduction data and outputs it to comparator (45). Comparator (45) compares the individual information that is input through ID receiver (41c) and recorded in individual information memory (26) with the reproduction permission information of reproduction permission information extractor (43). In this way, in this embodiment, the constitution is such that the functions that belong to the receiver in the first and second embodiments are carried out by recorder (3C).

[0082]

Let's look at the operation of the digital broadcast reception method in the third embodiment with said constitution. In transmitting station (1C), controller (4C) reads the data of

the program to be transmitted from TV signal server (6) that has plural programs stored in it. The method for charging program fees is determined according to type and value. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the license of each user. Also, reproducing permission information generator (14) receives the data from recorder (3C) that has recorded the program data and generates reproduction permission information, which specifies receiver (2C) that allows reproduction of the program.

[0083]

For example, the user has an ID in a form corresponding to receiver (2C), and the ID of each user, the viewing/listening permission pertaining to the program based on the license, and the reproduction permission information that indicates permission of reproduction stored in controller (4C) are sent to packet forming unit (9). Also, scrambler (8) scrambles the program data when the program is a pay-per-view program. In this case, the viewing/listening permission information, the key that decodes the scramble, the key for the information that specifies the key packet, the descrambling key, etc. are generated in the form of a prescribed MPEG signal known as ECM, EMM

[0084]

Also, the generated reproduction permission information is converted into a packet that can be multiplexed with MPEG signal by means of packet forming unit (9). Then, it is multiplexed in the digital broadcast signal by means of multiplexer (10), together with the table information for specifying the packet of each program generated in MPEG form by controller (4C), as well as said scrambling key and other information, and viewing/listening permission information, etc. Also, multiplexer (10) may multiplex packets of plural programs.

[0085]

The multiplexed data is converted by modulating/transmitting unit (11) into a digital broadcast signal that can be transmitted to receiver (2C) using a prescribed method corresponding to the transmission medium, such as a satellite broadcast, ground waves, CATV, etc. In receiver (2C), the received digital broadcast signal is demodulated by receiving/demodulating unit (21). The table information is extracted from the received signal by controller (28C), and the information pertaining to the program is displayed to the user. Then, the process of decoding the digital broadcast signal thereafter is the same as that of the prior art.

[0086]

On the basis of the recording fee in the viewing/listening permission information read by viewing/listening permission information extractor (22), controller (28C) shows the amount required for recording of the program by the user. When the user decides to record the program, recording fee information generator (34C) generates the recording fee information, and adds it to the prescribed region of individual information memory (26). The recording fee information in individual information memory (26) is regularly uploaded to transmitting station (1C) through modem (25) together with the fee information for viewing/listening. If the user does not decide to record the program, recording fee information generator (34C) does not operate, and the recording of the program is not carried out. When there is no fee information, said operation is not carried out, and the next operation is carried out directly.

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[0087]

In recording mode, the packet of the selected program for recording is assigned by controller (28C). Then, the assigned packet is selected by demultiplexer (24), and the program data is output to digital interface (32C). Also, the packet for recording can be recorded by recorder (3C) in scrambled or descrambled form, depending on the assignment.

[0088]

Digital interface (32C) converts the packet output from demultiplexer (24) to a prescribed transmission form, and outputs it. Then, digital interface (41C) converts the input packet back to the original transmission form, and outputs it to the recording equipment. Upon receiving the packets to be recorded, the recording equipment records each packet in a prescribed form on a recording medium.

[0089]

When the user selects reproduction of the program from recorder (3C), the recording equipment recovers the input timing, and reproduces the various packets. At the same time, reproducing permission information extractor (43) extracts the reproduction permission information, and controller (44) requests that the individual information stored in individual information memory (26) in receiver (2C) to recorder (3C). Controller (28C) of requested receiver (2C) outputs the individual information stored in individual information memory (26) of the IC card to ID transmitter (32c) of digital interface (32C).

[0090]

ID transmitter (32c) converts the individual information to a prescribed transmission format, and transmits it to recorder (3C). Recorder (3C) makes use of comparator (45) to compare the individual information received by ID receiver (41c) with the reproduction permission information extracted by reproduction permission information extractor (43). As a result of said comparison, if reproduction is permitted, the reproduction packet is output through digital interface (41C) to receiver (2C). If reproduction is not permitted, the output of the reproduction packet is stopped, and a no-permission message is shown to the user on an LED display unit.

[0091]

Upon receiving of the reproduction packet through digital interfaces (41C), (32C), receiver (2C) outputs the reproduction packet to demultiplexer (24). Controller (28C) assigns the packet of the program for recording on the basis of the table information. Demultiplexer (24) selects the assigned packet and outputs it to audio decoder (29), video decoder (30), and/or text decoder (31).

[0092]

As in the second embodiment, one may also adopt the following method: instead specifying recorder (3C), receiver (2C) that can perform reproduction is limited to the portion of the digital interface; as a result, recording limitations are reduced, and after the program data is recorded, reproduction permission is allowed, and the contents of the IC card are refreshed. In this case, it is possible to manage the program for direct viewing/listening and the program for recording independently of each other, and it is possible to record one program while viewing another. Also, this embodiment may be adopted for managing the fee in reproduction.

[0093]

Embodiment 4

In the following, let's look at the digital broadcast reception method in the fourth embodiment of the present invention with reference to Figures 7 and 8. Figure 7 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of this embodiment. Figure 8 is a block diagram illustrating the constitution of the receiver. The same part numbers as were used in the system of the third embodiment are used here, and their explanation will not be repeated.

[0094]

As shown in Figure 7, transmitting station (1D) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to the user having a receiver. As in the first embodiment, transmitting station (1D) has controller (4D), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), and modulating/transmitting unit (11). In addition, transmission specifying information generator (15) is set in transmitting station (1D) of this embodiment.

[0095]

Viewing/listening permission information generator (7) generates a viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fee pertaining to recording stored in controller (4D). Said transmission specifying information generator (15) generates the transmission specifying information, which is information that specifies the interface between receiver (2D) and recorder (3D). More specifically, the transmission characteristics [sic, specifying] refers to the serial number and manufacturer code for the given IEEE 1394 bus.

[0096]

Receiver (2D) shown in Figure 8 receives the digital broadcast signal broadcast from transmitting station (1D) via satellite, ground waves, CATV, or another transmission medium, and it is located at the site of the licensed customer. As in the third embodiment, receiver (2D) also has receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), controller (28D), audio decoder (29), video decoder (30), text decoder (31), digital interface (32C), and recording fee information generator (34D).

[0097]

This embodiment differs from the third embodiment in that its digital interface (32D) contains IF information transmitter (32d). Digital interface (32D) outputs the program data, and, at the same time, converts the transmission specifying information into a prescribed format and outputs it via IF information transmitter (32d). In this case, recording fee information generator (34D) extracts the recording fee information from the data of digital interface (32D), and adds it to the prescribed region of individual information memory (26).

[0098]

Recorder (3D) shown in Figure 7 records the program data received by receiver (2D) in a recording medium, and it can also reproduce the recorded data. Recorder (3D) has digital interface (41D) that contains IF information receiver (41d) and IF information transmitter (41e), as well as transmission permission information extractor (46), controller (44D) and comparator (45D). Digital interface (32D) of receiver (2D) and digital interface (41D) of recorder (3D) are connected by means of IEEE 1394 bus.

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[0099]

Digital interface (41D) recovers the timing input to the recording equipment, and at the same time reproduces the data for each packet. With a command from controller (44D), transmission permission information extractor (46) extracts the transmission permission information from the reproduction data, and outputs it to comparator (45D). Comparator (45D) compares the transmission specifying information that is input through IF information receiver (41d) with the transmission permission information of transmission permission information extractor (46). IF information transmitter (41e) transmits the specifications of the interface of recorder (3D) itself to receiver (2D).

[0100]

Let's look at the operation of the digital broadcast reception method in the fourth embodiment with said constitution. In transmitting station (1D), controller (4D) reads the data of the program to be transmitted from TV signal server (6) that has plural programs stored in it. The method for charging fees for the program is set according to type and cost. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the contract of each user. Also, transmission specifying information generator (15) generates a transmission specifying information (interface specifying information) for specifying the interface that allows transmission of the program data by means of recorder (3D) and receiver (2D). For example, this information is the serial number and manufacturer's code for the given IEEE 1394 bus. Packet forming unit (9) inserts the information that describes the viewing/listening permission and transmission permission about the program on the basis of the contract transmission permission information to a prescribed packet.

[0101]

Scrambler (8) scrambles the program data of pay-per-view programs. In this case, the viewing/listening permission information, the key that decodes the scramble, the key for the

information that specifies the key packet, the descrambling key, etc. are generated in the form of prescribed MPEG signal known as ECM, EMM. Also, the generated transmission permission information is converted into a packet form that can be multiplexed to MPEG signal by means of packet forming unit (9). Then, it is multiplexed by means of multiplexer (10). In this case, by means of controller (4D), the table information for specifying the packet of each program generated in MPEG form, as well as said scrambling key and other information, and viewing/listening permission information, etc. are also multiplexed at the same time. Also, multiplexer (9)[sic, (10)] may multiplex the packets of plural programs.

[0102]

The multiplexed data is converted by modulating/transmitting unit (11) into a digital broadcast signal that can be modulated and transmitted using a prescribed method corresponding to the transmission medium, such as satellite broadcasting, ground waves, CATV, etc.

[0103]

In receiver (2D), the received digital broadcast signal is demodulated by receiving/demodulating unit (21), the table information is extracted from the received signal by controller (28D), and the information pertaining to the program is displayed to the user. The process of decoding the transmitted digital broadcast signal and then reproducing of the program is the same as that in the preceding embodiments.

[0104]

In recording of the program data, the packet of the selected program for recording is assigned by controller (28D). Then, the assigned packet is selected by demultiplexer (24), and the program data is output to digital interface (32D). Also, the packet for recording can be recorded in recorder (3D) in scrambled or descrambled form, depending on the assignment.

[0105]

Digital interface (32D) converts the packet output from demultiplexer (24) into a prescribed transmission form, and outputs it to recording device (3D). Then, digital interface (41D) converts the input packet from the transmission form back into the original form, and outputs it to the recording equipment. Upon receiving the packets through digital interfaces (32D) and (41D), the recording equipment records each packet in a prescribed form on a recording medium.

[0106]

When the user decides to reproduce the program from recorder (3D), recorder (3D) recovers the timing input to the recording equipment, and reproduces each packet. At the same time, transmission permission information extractor (46) extracts the transmission permission information, and requests that the serial number and manufacturer's code be transmitted to digital interfaces (32D) and (41D). IF information transmitter (32d) of requested digital interface (32D) and IF information transmitter (41e) of digital interface (41D) output the serial number and manufacturer's code in the form prescribed by IEEE 1394.

[0107]

Recorder (3D) compares the serial number and manufacturer's code sent to IF information receiver (41d) with the transmission permission information extracted by transmission permission information extractor (46) by means of comparator (45D). As a result of said comparison, when transmission is permitted, the packet program is sent via digital interface (41D) to receiver (2D). If reproduction is not permitted, transmission of the program is stopped, and a no-permission message is displayed to the user on an LED display unit or the like.

[0108]

Upon receiving of packets via digital interfaces (41D), (32D), receiver (2D) outputs the packets to demultiplexer (24). Controller (28D) assigns the packet of the program for recording on the basis of the table information. Demultiplexer (24) selects the assigned packet and outputs it to audio decoder (29), video decoder (30), and/or text decoder (31).

[0109]

In this embodiment, without specifying recorder (3D), reproducing receiver (2D), and IC card, or other individual information memory, by defining the transmission route, it is possible to restrict the recording of program data in a more reliable way. Also, it is possible to manage the program for direct viewing/listening and the program for recording independently of each other, and it is possible to record one program while watching another. Also, this embodiment may be adopted for managing the fees for reproduction.

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[0110]

Embodiment 5

In the following, let's look at the digital broadcast reception method in the fifth embodiment of the present invention with reference to Figures 9 and 10. Figure 9 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital

broadcast reception method of this embodiment. Figure 10 is a block diagram illustrating the constitution of the receiver. The same part numbers as were used in the system of the fourth embodiment are used here, and their explanation will not repeated.

[0111]

As shown in Figure 9, transmitting station (1E) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to the user with a receiver. As in the fourth embodiment, transmitting station (1E) comprises controller (4E), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), modulating/transmitting unit (11) and transmission specifying information generator (15).

[0112]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as fees pertaining to recording stored in controller (4E). Said transmission specifying information generator (15) generates the transmission specifying information, which is information for specifying the interface between receiver (2E) and recorder (3E). More specifically, the transmission specifying information refers to the serial number and manufacturer's code for a given IEEE 1394 bus.

[0113]

Receiver (2E) shown in Figure 10 receives the digital broadcast signal broadcast from transmitting station (1E) via satellite, ground waves, CATV, or another transmission medium, and it is located at the site of the customer that has contracted for the program service. As in the fourth embodiment, receiver (2E) also contains receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), controller (28E), audio decoder (29), video decoder (30), text decoder (31), and digital interface (32E).

[0114]

This embodiment differs from the fourth embodiment in that instead of a recording fee information generator, reproduction fee information generator (34E) is used. Also, digital interface (32E) has IF information transmitter (32e) and IF information receiver (32f). Reproduction fee information generator (34E) generates reproduction fee information and adds it to the prescribed region of individual information memory (26) when the user reproduces the

program from recorder (3E). Digital interface (32E) outputs the program data, and, at the same time, it converts and outputs the transmission characteristics information (IF information) of receiver (2E) in a prescribed transmission format through IF information transmitter (32e), or has the IF information of recorder (3E) input to it through IF information receiver (32f).

Reproduction fee information generator (34E) extracts the reproduction fee information from the data of digital interface (32E) and adds it to the prescribed region of individual information memory (26).

[0115]

Recorder (3E) shown in Figure 9 records the program data received by receiver (2E) on a recording medium, and it can also reproduce the recorded data. Recorder (3E) has digital interface (41E) that contains IF information transmitter (41e). Digital interface (32E) of receiver (2E) and digital interface (41E) of recorder (3E) are connected by means of IEEE 1394 bus. Digital interface (41E) recovers the timing input to the recording equipment, and at the same time reproduces the data of each packet.

[0116]

Let's look at the operation of the digital broadcast reception method in the fifth embodiment with said constitution. In transmitting station (1E), controller (4E) reads the data of the program to be transmitted from TV signal server (6) that contains plural programs. The method for charging fees for programs is set according to type and cost. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the license of said user, and the information about the reproduction fees. Also, transmission specifying information generator (15) generates interface specifying information for specifying the interface that allows transmission of the program between recorder (3E) and receiver (2E).

[0117]

Transmission specifying information generator (15) sends the serial number and manufacturer's code for a given IEEE 1394 bus, as well as the viewing/listening permission about the program on the basis of the license, and the transmission permission information that describes the transmission permission to packet (9). Scrambler (8) scrambles the program data of pay-per-view programs. In the case, the viewing/listening permission information, the descrambling key, the key for the information that specifies the key packet, the descrambling key, etc. are generated in the form of prescribed MPEG signal known as ECM, EMM.

[0118]

By means of packet forming unit (9), the generated transmission permission information is converted into a packet form, such as a private data packet, which can be multiplexed to MPEG signal. Then, the program data is multiplexed by means of multiplexer (10). At the same time, by means of controller (4E), the table information for specifying the packet of each program generated in MPEG form, as well as said scramble key and other information, and viewing/listening permission information, etc. are also multiplexed. Also, multiplexer (10) may multiplex the packets of plural programs. The multiplexed data is converted by modulating/transmitting unit (11) into a digital broadcast signal, and it is modulated using a prescribed method corresponding to the transmission medium, such as a satellite broadcast, ground waves, CATV, etc. It is then transmitted to receiver (2E).

[0119]

In receiver (2E), the received digital broadcast signal is demodulated by receiving/demodulating unit (14). The table information is extracted from the received signal by controller (28E), and the information pertaining to the program is displayed to the user. The process of decoding the transmitted digital broadcast signal and the reproducing the program is the same as that in the preceding embodiments.

/15

[0120]

In recording the program data, the packet of the selected program for recording is assigned by controller (28E). Then, the assigned packet is selected by demultiplexer (24), and the program data is output to digital interface (32E). Also, controller (28E) requests digital interfaces (32E), (41E) to transmit the serial number and manufacturer's code. IF information transmitters (32e), (41e) of the requested digital interface are reported to controller (28E) in the prescribed form defined by IEEE 1394.

[0121]

Reproduction fee information generator (34E) collects the interface information for recorder (3E) and receiver (2E) and stores the route information during recording. This route information is transmitted to transmitting station (1E) through modem (25). Also, corresponding to the assignment, the recorded packet may be recorded by recorder (3E) in descrambled or scrambled form. Here, as an example, it is recorded in scrambled form, and later decoded when the reproduction fee is charged.

[0122]

Digital interface (32E) outputs the packets output from demultiplexer (24) in a prescribed transmitting form to recorder (3E). Digital interface (41E) converts the input packet from the transmission form back into the original form, and outputs it to the recording equipment. Upon receiving the packet to be recorded, the recording equipment records each packet in a prescribed format on a recording medium.

[0123]

When the user selects reproduction of the program from recorder (3E), recorder (3E) recovers the timing input to the recording equipment and reproduces each packet. On the basis of the reproduction fee in the viewing/listening information read by viewing/listening permission information extractor (22), the amount required for reproduction of the program is shown to the user. If the user decides to reproduce the program, recording fee information generator (34E) generates the recording fee information and adds it to the prescribed region of individual information memory (26). The reproduction fee information in individual information memory (26) is regularly uploaded to transmitting station (1E) through modem (25) together with the fee information for viewing/listening.

[0124]

If the user does not select recording of the program data, recording fee information generator (34E) does not operate, and the reproduction operation does not take place. When there is no fee information in the transmission data, the aforementioned operation is not performed, and the operation to be explained below is performed directly. Controller (28E) requests digital interfaces (32E), (41E) to transmit the serial number and the manufacturer's code. IF information transmitters (32e) and (41e) of the requested digital interfaces transmit the serial number and manufacturer's code of IEEE 1394 bus in a prescribed form to controller (28E).

[0125]

Transmission specifying information extractor (15) collects the information of the digital interface of obtained recorder (3E) and receiver (2E), and stores the route information for reproduction. Controller (4E) compares the recording route information with the reproduction route information. If they are the same, permission is given to receiver (2E) such that the data obtained through digital interface (32E) is decoded. On the other hand, when the route information data are different, receiver (2E) is instructed not to receive data from digital interface (32E).

[0126]

When the route information data are different, if additional fees are paid, the system allows recording or reproduction of the program data in recorder (3E). When transmitting station (1E) performs operation for an additional fee, the amount of the additional fee is calculated on the basis of the difference in the route information, and the amount of the additional fee is sent to the user. When the user selects viewing/listening of the program by means of the additional fee, the additional fee is added to the portion of the amount of the fee of individual information memory (26), and at the same time permission is sent to receiver (2E) such that the data from digital interface (32E) is decoded. Receiver (2E) that receives the packet through digital interface (32E) sends this packet to demultiplexer (24).

[0127]

Controller (28E) assigns the packet of the program recorded by means of the table information; and demultiplexer (24) selects the assigned packet and outputs it to audio decoder (29), video decoder (30), and/or text decoder (31). Instead of specifying recorder (3E) and specifying receiver (2E) or individual information memory (26) that can be reproduced, by limiting the transmission route, it is possible to restrict reproduction or recording of programs more reliably. Also, it is possible to manage the program for direct viewing/listening and the program for recording independent from each other, and it is possible to record one program while watching another. Also, this embodiment may be adopted to the reproduction fees. In particular, this system allows stepwise addition of fees corresponding to the given route.

[0128]

Embodiment 6

In the following, let's look at the digital broadcast reception method in the sixth embodiment of the present invention with reference to Figures 11 and 12. Figure 11 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of this embodiment. Figure 12 is a block diagram illustrating the constitution of the receiver. The same part numbers that were used in the system of the third embodiment are used here, but their explanation will not be repeated.

[0129]

As shown in Figure 11, transmitting station (1F) multiplexes plural channels of video, audio, text data, etc., converts them into digital broadcast signal, and sends the program to the user that has a receiver. As in the third embodiment, transmitting station (1F) has controller (4F),

modem (5F), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), modulating/transmitting unit (11) and reproduction permission information generator (14F).

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[0130]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fees pertaining to recording stored in controller (4F). Said reproduction permission information generator (14F) generates the reproduction permission information, which is information for receiving the reproduction data from recorder (3F) that records the program and specifies reproducible recorder (2F). This information is sent to packet forming unit (9) and is inserted into a prescribed packet.

[0131]

Receiver (2F) shown in Figure 12 receives the digital broadcast signal broadcast from transmitting station (1F) via satellite, ground waves, CATV, or another transmission medium, and it is set at the location of the customer licensed with the program service. As in the third embodiment, receiver (2F) also comprises receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24), modem (25), individual information memory (26), controller (28F), audio decoder (29), video decoder (30), text decoder (31), digital interface (32F) and recording fee information generator (34F).

[0132]

In addition to the structural elements of the third embodiment, in this embodiment, reproduction descrambler (38) and recording scrambler (37) are also arranged in receiver (2F). Recording fee information generator (34F) extracts the recording fee information from the data of digital interface (32F) and adds it to the prescribed region of individual information memory (26). Recording scrambler (37) scrambles the packet of the selected program and sends it to digital interface (32F). Reproduction descrambler (38) descrambles the packet of the recording program output from digital interface (32F) and sends it to demultiplexer (24).

[0133]

Recorder (3F) shown in Figure 11 records the program data received by receiver (2F) on a recording medium, and it can also reproduce the recorded data. Recorder (3F) contains digital interface (41F). Digital interface (32F) of receiver (2F) and digital interface (41F) of recorder

(3F) are connected by means of an IEEE 1394 bus. Digital interface (41F) recovers the timing input to the recording equipment, and at the same time reproduces the data for each packet.

[0134]

Let's look at the operation of the digital broadcast reception method in the sixth embodiment with said constitution. In transmitting station (1F), controller (4F) reads the program data to be transmitted from TV signal server (6) that contain plural programs. The method for charging program fees is set according to type and value. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the contract of said user.

[0135]

For example, the user has an ID in form corresponding to receiver (2F), and the ID of each user, viewing/listening permission about the program on the basis of the contract, and the reproduction permission information that describes reproduction permission stored in controller (4F) are output to packet forming unit (9), respectively. Also, scrambler (8) scrambles the program data for pay-per-view programs. In this case, the viewing/listening permission information, the key that decodes the scrambling, the key for the information that specifies the key packet, the descrambling key, etc. are generated in the form of prescribed MPEG signal known as ECM, EMM.

[0136]

By means of packet forming unit (9), the generated reproduction permission information is converted into packet form that can be multiplexed to an MPEG signal. Then, the program data is multiplexed by means of multiplexer (10). At the same time, by means of controller (4F), the table information for specifying the packet of each program generated in MPEG form, as well as said scramble key and other information, and viewing/listening permission information, etc. are also multiplexed by multiplexer (10). Also, multiplexer (10) may multiplex the packets of plural programs.

[0137]

The multiplexed data is sent to modulating/transmitting unit (11) and is converted into a digital broadcast signal. This signal is modulated using a prescribed method corresponding to the transmission medium, such as a satellite broadcast, ground waves, CATV, etc., and it is transmitted to receiver (2F).

[0138]

In receiver (2F), the received digital broadcast signal is demodulated by receiving/demodulating unit (21). The table information is extracted from the received signal by controller (28F), and the information pertaining to the program is displayed to the user. The process of decoding the transmitted digital broadcast signal and reproducing the program is the same as that in the preceding embodiments.

[0139]

In recording of the program data, the packet of the selected program for recording is assigned by controller (28F). Then, the assigned packet is selected by demultiplexer (24), and the program data is output to recording scrambler (37). Recording scrambler (37) scrambles the packet of the selected program.

[0140]

As a result, independently of the conventional scrambled form for viewing/listening, it is possible to perform independent scrambling on the recording side. For the present scrambling for viewing/listening, the key information varies over time, and the recorded program cannot be viewed after a certain period. However, this problem can be solved with the aforementioned method. The recorded packet is recorded by recorder (3F) in its unmodified scrambled form for recording.

[0141]

Digital interface (32F) outputs to recorder (3F) the packets output from recording scrambler (37) in a prescribed transmitting form. Digital interface (41F) converts the input packet from the transmission form back to the original form and outputs it to the recording equipment. The recording equipment forms a packet for the program data scrambled in the prescribed format and records it.

[0142]

When the user selects reproduction of the program from recorder (3F), the timing input to the recording equipment is recovered, while each packet is reproduced. When the packet is received through digital interface (32F), reproduction descrambler (37) decodes the scrambling of the input data, and sends it to demultiplexer (24).

[0143]

Controller (38F) assigns the packet of the program recorded by means of the table information; demultiplexer (24) selects the assigned packet and outputs it to audio decoder (29), video decoder (30), and/or text decoder (31). Instead of specifying recorder (3F) and specifying receiver (2F) or IC card that can be reproduced, by scrambling on the transmission route, it is possible to restrict reproduction or recording of programs more reliably.

[0144]

Embodiment 7

In the following, let's look at the digital broadcast reception method in the seventh embodiment of the present invention with reference to Figures 13 and 14. Figure 13 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of this embodiment. Figure 14 is a block diagram illustrating the constitution of the receiver. The same part numbers as were used in the system of the sixth embodiment are used here, and their explanation will not be repeated.

[0145]

As shown in Figure 13, transmitting station (1G) multiplexes plural channels for video, audio, text data, etc., converts them into digital broadcast signals, and sends the program to the user having a receiver. As in the sixth embodiment, transmitting station (1G) has controller (4G), modem (5), TV signal server (6), viewing/listening permission information generator (7), scrambler (8), packet forming unit (9), multiplexer (10), and modulating/transmitting unit (11).

[0146]

Viewing/listening permission information generator (7) generates viewing/listening permission information that describes the viewing/listening permission pertaining to the ID of each user and programs as well as the fee pertaining to recording stored in controller (4G). The viewing/listening permission information is sent to packet forming unit (9) and is inserted into a prescribed packet.

[0147]

Receiver (2G) shown in Figure 14 receives the digital broadcast signal broadcast from transmitting station (1G) via satellite broadcasting, ground waves, CATV, or other transmission medium, and it is set at the location of the customer with the contracted program service. As in the sixth embodiment, receiver (2G) also contains receiving/demodulating unit (21), viewing/listening permission information extractor (22), descrambler (23), demultiplexer (24),

modem (25), individual information memory (26), controller (28G), audio decoder (29), video decoder (30), text decoder (31), and digital interface (32G).

[0148]

In addition to the structural elements of the aforementioned embodiment, in this embodiment, receiver (2F) also has recording fee information generator (34G), descrambler history evaluator (39) and descrambler history generator (40). Reproduction fee information generator (34G) extracts the reproduction fee information based on the judgment result of descrambler history evaluator (39), and adds it to the prescribed region of individual information memory (26). Descrambler history generator (40) generates a "1" bit when scrambling is deactivated for the demodulated data of the digital broadcast signal with descrambler (23), and it generates a "0" bit when the digital broadcast signal is not scrambled, or when scrambling cannot be performed by descrambler. Said bit is sent to digital interface (32G). From the data output from digital interface (32G), descrambler history evaluator (39) judges said bit information. For the "1" bit, a fee command is sent to reproduction fee information generator (34G).

[0149]

Recorder (3G) shown in Figure 13 records the program data received by receiver (2G) in a recording medium, and it can also reproduces the recorded data. Recorder (3G) contains digital interface (41G). Digital interface (32G) of receiver (2G) and digital interface (41G) of recorder (3G) are connected by means of IEEE 1394 bus. Digital interface (41G) recovers the timing input to the recording equipment, and at the same time reproduces the data for each packet.

[0150]

Let's look at the operation of the digital broadcast reception method in the seventh embodiment with said constitution. In transmitting station (1G), controller (4G) reads the data of the program to be transmitted from TV signal server (6) that contains plural programs. The method for charging fees for the program is set according to type and value. Viewing/listening permission information generator (7) generates the viewing/listening permission information that indicates whether viewing/listening is permitted for each user on the basis of the contract of said user.

[0151]

Scrambler (8) scrambles the program data for pay-per-view programs. In this case, the viewing/listening permission information of the program, the descrambling key, the key for the information that specifies the key packet, etc. are generated in the form of prescribed MPEG

signal known as ECM, EMM. Then, said information data is multiplexed by multiplexer (10). The multiplexed data is sent to modulating/transmitting unit (11) and converted into a digital broadcast signal. This signal is transmitted to receiver (2G) using a prescribed method corresponding to the transmission medium, such as satellite broadcasts, ground waves, CATV, etc.

[0152]

In receiver (2G), the received digital broadcast signal is demodulated by receiving/demodulating unit (21). The table information is extracted from the received signal by controller (28G), and the information pertaining to the program is displayed to the user. The process of decoding the transmitted digital broadcast signal and reproducing the program is the same as that used in the preceding embodiments.

[0153]

When the user selects the program to be recorded, descrambler (23) decodes the scrambling of the recorded packet, and outputs it to digital interface (32G). In this case, descrambler history generator (40) sets the bit of the scrambling deactivation information at a prescribed position in the packet of the digital broadcast signal to "1". In this case, the scramble release information bit is set to "0" when the digital broadcast signal is not scrambled, or when the program to be recorded is left scrambled, or when descrambling is not permitted and descrambling is not carried out. When the packet to be recorded is received by recorder (3G) from digital interface (32G), the program data is converted into packet form with a prescribed format and is recorded.

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[0154]

When the user selects reproduction of the program data from recorder (3G), the timing input to the recording equipment is recovered, while each packet is reproduced. When the packet is output through digital interface (32G), descrambler history evaluator (39) evaluates said bit information. Here, if the result of the judgment is bit "1", in recording, the data is regarded as descrambled data, and the fee required for descrambling is reported to reproduction fee information generator (34G).

[0155]

When the user selects reproduction of the program data from recorder (3G), reproduction fee information generator (34G) generates reproduction fee information, and adds it to a prescribed region of individual information memory (26). The reproduction fee information in

individual information memory (26) is regularly uploaded through modem (25) to transmitting station (1G) together with the viewing/listening fee information.

[0156]

If the scrambling deactivation history bit is "0," the program data is not scrambled. The program is either a free program or it does not require descrambling. In any case, if viewing/listening of the program is permitted, controller (38G) assigns the packet of the program for reproduction on the basis of the table information, and demultiplexer (24) selects the assigned packet and outputs it to audio decoder (29), video decoder (30), and/or text decoder (31).

[0157]

Effects of the invention

When a program is broadcast in digital format, the program might be copied by a user on a recording medium without degradation of the data. According to the present invention, when the transmitting station transmits the program data to each receiver, information that specifies the recorder and reproduction receiver used for recording and reproduction of the program data, as well as reproduction permission, transmission information, etc. is added for transmission. As a result, if said specifying information fails to match, the user cannot record or reproduce the program. Consequently, even if viewing/listening of a program is permitted according to the receiving contract, if the user wants to record the program on a recording medium, he/she still must pay additional fees. As a result, the rights of the copyright holder are protected. Also, the fee information for viewing/listening, reproduction, or recording is automatically reported to the transmitting station.

Brief description of the figures

Figure 1 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the first embodiment of the present invention.

Figure 2 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the first embodiment of the present invention.

Figure 3 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the second embodiment of the present invention.

Figure 4 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the second embodiment of the present invention.

Figure 5 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the third embodiment of the present invention.

Figure 6 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the third embodiment of the present invention.

Figure 7 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the fourth embodiment of the present invention.

Figure 8 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the fourth embodiment of the present invention.

Figure 9 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the fifth embodiment of the present invention.

Figure 10 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the fifth embodiment of the present invention.

Figure 11 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the sixth embodiment of the present invention.

Figure 12 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the sixth embodiment of the present invention.

Figure 13 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method in the seventh embodiment of the present invention.

Figure 14 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method in the seventh embodiment of the present invention.

Figure 15 is a block diagram illustrating the constitution of the transmitting station and recorder in the digital broadcast reception method of the prior art.

Figure 16 is a block diagram illustrating the constitution of the receiver in the digital broadcast reception method of the prior art.

Brief description of reference numbers

1A, 1B, 1C, 1D, 1E, 1F, 1G Transmitting station

2A, 2B, 2C, 2D, 2E, 2F, 2G Recorder

3A, 3B, 3C, 3D, 3E, 3F, 3G Recorder

4A, 4B, 4C, 4D, 4E, 4F, 4G, 28A, 28B, 28C, 28D, 28E, 28F, 28G, 44 Controller

5, 5F, 25 Modem

6	TV signal server
7	Viewing/listening permission information generator
8	Scrambler
9	Packet forming unit
10	Multiplexer
11	Modulating/transmitting unit
12	Recorder specifying information generator
13	Reproducing receiver specifying information generator
14, 14F	Reproduction permission information generator
15	Transmission specifying information generator
21	Receiving/demodulating unit
22	Viewing/listening permission information extractor
23	Descrambler
24	Demultiplexer
26	Individual information memory
27, 27E,	
45, 45 D	Comparator
29	Audio decoder
30	Video decoder
31	Text decoder
32A, 32B, 32C, 32D, 32E, 32F,	
32G, 41A, 41B, 41C, 41D, 41E,	
41F, 41G	Digital interface
32c	ID transmitter
32d, 32e, 41e	IF information transmitter
33	Recording permission information extractor
34c, 35	ID transmitter
34A, 34B, 34C,	
34D, 34E	Recording fee information generator
34F	Reproduction fee information generator
35	Reproduction receiver specifying information extractor
36	Transmission permission information extractor
38	Descrambler for reproduction
37	Descrambler for recording
39	Descrambler history evaluator
40	Descrambler history generator

- 41d, 32f, IF Information receiver
 41c ID receiver
 41d IF information receiver
 43 Reproduction permission information extractor
 46 Transmission permission information extractor

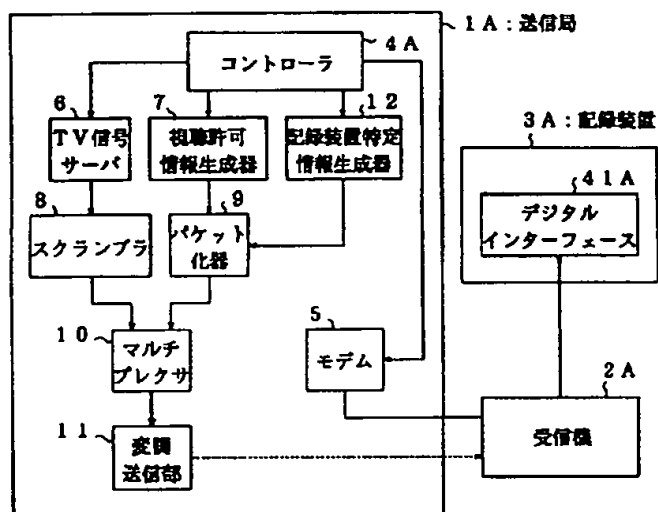


Figure 1

- Key: 1A Transmitting station
 2A Recorder
 3A Recorder
 4A Controller
 5 Modem
 6 TV signal server
 7 Viewing/listening permission information generator
 8 Scrambler
 9 Packet forming unit
 10 Multiplexer
 11 Modulating/transmitting unit
 12 Recorder specifying information generator

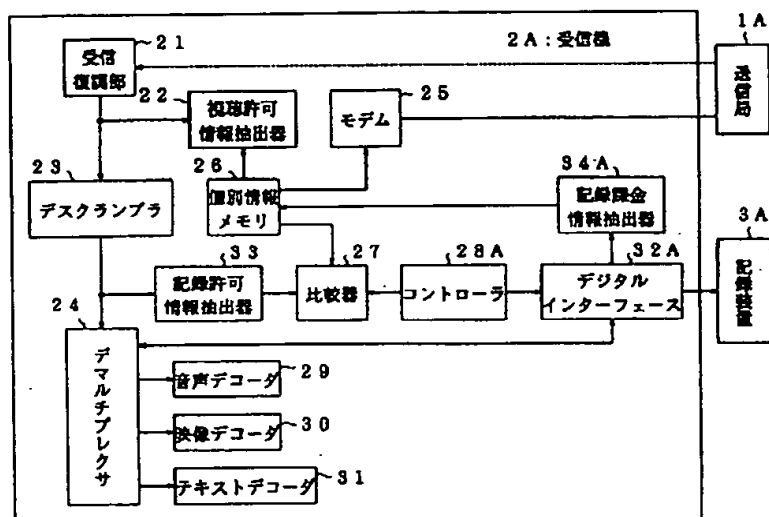


Figure 2

Key:	1A	Transmitting station
	2A	Recorder
	3A	Recorder
	21	Receiving/demodulating unit
	22	Viewing/listening permission information extractor
	23	Descrambler
	24	Demultiplexer
	25	Modem
	26	Individual information memory
	27	Comparator
	28A	Controller
	29	Audio decoder
	30	Video decoder
	31	Text decoder
	32A	Digital interface
	33	Recording permission information extractor
	34A	Recording fee information generator

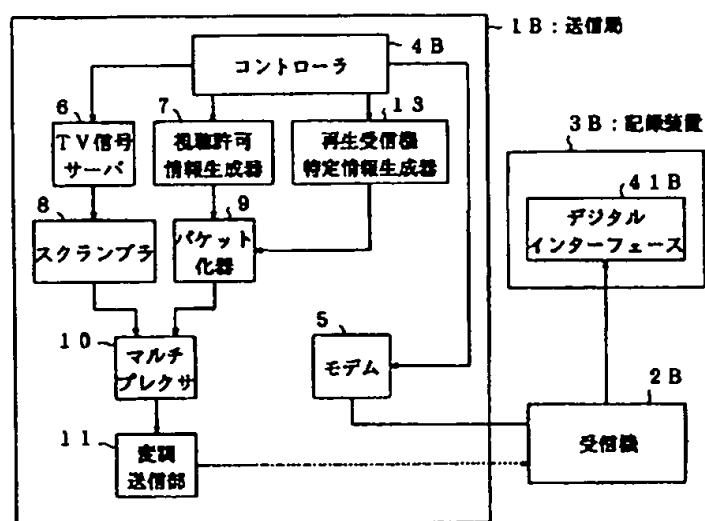


Figure 3

Key:	1B	Transmitting station
	2B	Recorder
	3B	Recorder
	4B	Controller
	5	Modem
	6	TV signal server
	7	Viewing/listening permission information generator
	8	Scrambler
	9	Packet forming unit
	10	Multiplexer
	11	Modulating/transmitting unit
	13	Reproduction receiver specifying information generator
	41B	Digital interface

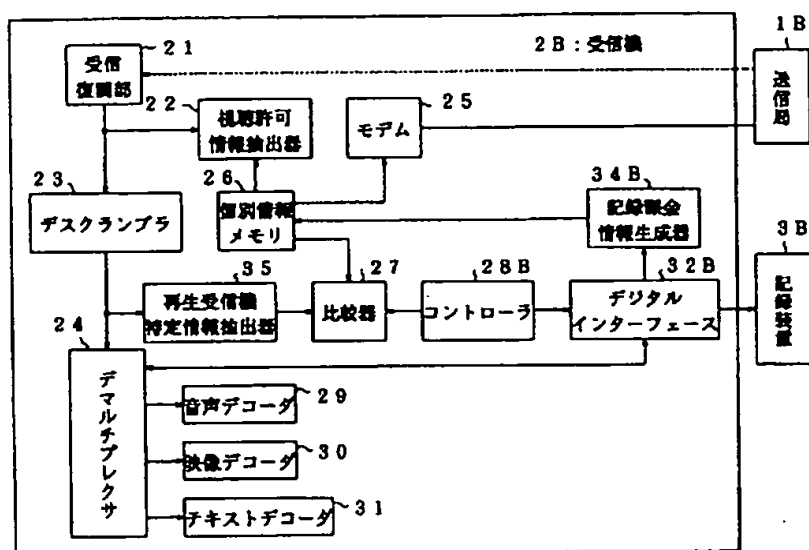


Figure 4

Key:	1B	Transmitting station
	2B	Recorder
	3B	Recorder
	21	Receiving/demodulating unit
	22	Viewing/listening permission information extractor
	23	Descrambler
	24	Demultiplexer
	25	Modem
	26	Individual information memory
	27	Comparator
	28B	Controller
	29	Audio decoder
	30	Video decoder
	31	Text decoder
	32B	Digital interface
	34B	Recording fee information generator
	35	Reproduction receiver specifying information extractor

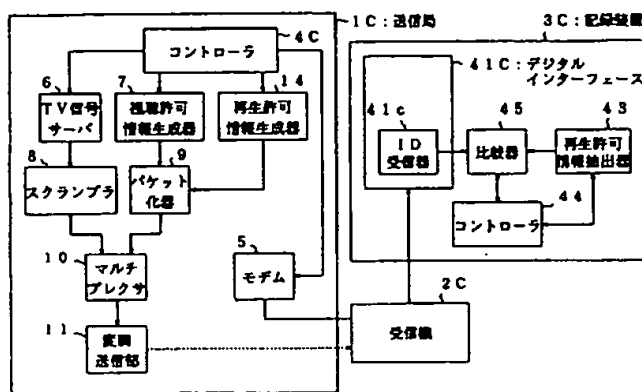


Figure 5

- Key:
- 1C Transmitting station
 - 2C Recorder
 - 3C Recorder
 - 4C Controller
 - 5 Modem
 - 6 TV signal server
 - 7 Viewing/listening permission information generator
 - 8 Scrambler
 - 9 Packet forming unit
 - 10 Multiplexer
 - 11 Modulating/transmitting unit
 - 14 Reproduction permission information generator
 - 41C Digital interface
 - 41c ID receiver
 - 43 Reproduction permission information extractor
 - 44 Controller
 - 45 Comparator

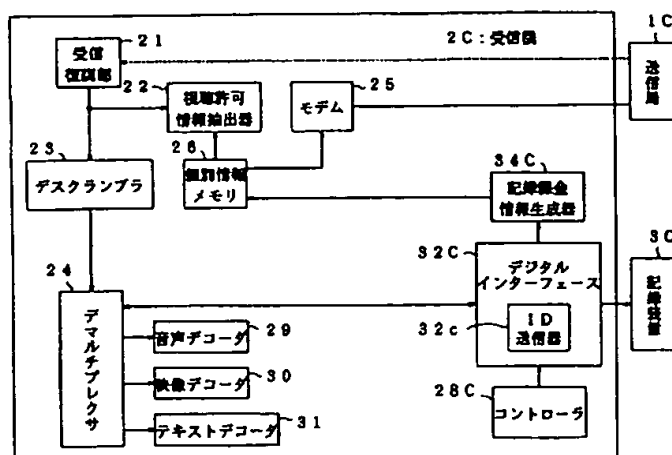


Figure 6

- Key:
- 1C Transmitting station
 - 2C Recorder
 - 3C Recorder
 - 21 Receiving/demodulating unit
 - 22 Viewing/listening permission information extractor
 - 23 Descrambler
 - 24 Demultiplexer
 - 25 Modem
 - 26 Individual information memory
 - 28C Controller
 - 29 Audio decoder
 - 30 Video decoder
 - 31 Text decoder
 - 32C Digital interface
 - 32c ID transmitter
 - 34C Recording fee information generator

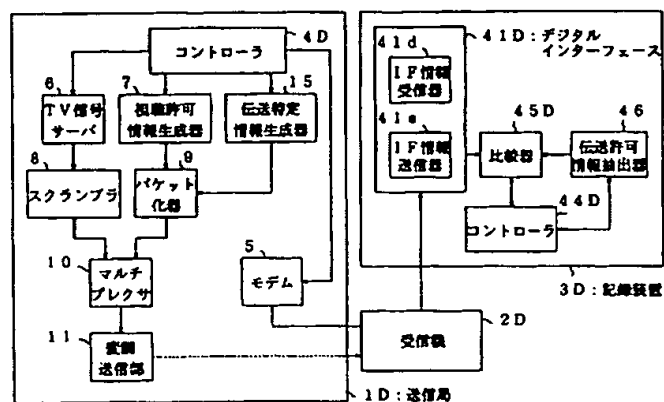


Figure 7

- Key:
- 1D Transmitting station
 - 2D Recorder
 - 3D Recorder
 - 4D Controller
 - 5 Modem
 - 6 TV signal server
 - 7 Viewing/listening permission information generator
 - 8 Scrambler
 - 9 Packet forming unit
 - 10 Multiplexer
 - 11 Modulating/transmitting unit
 - 15 Transmission specifying information generator
 - 41D Digital interface
 - 41d IF information receiver
 - 41e IF information transmitter
 - 44D Controller
 - 45D Comparator
 - 46 Transmission permission information extractor

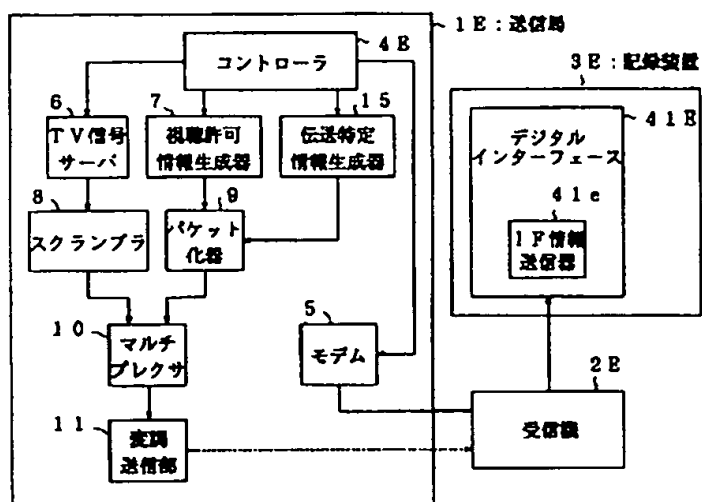


Figure 9

- Key:
- 1E Transmitting station
 - 2E Recorder
 - 3E Recorder
 - 4E Controller
 - 5 Modem
 - 6 TV signal server
 - 7 Viewing/listening permission information generator
 - 8 Scrambler
 - 9 Packet forming unit
 - 10 Multiplexer
 - 11 Modulating/transmitting unit
 - 15 Transmission specifying information generator
 - 41E Digital interface
 - 41e IF information transmitter

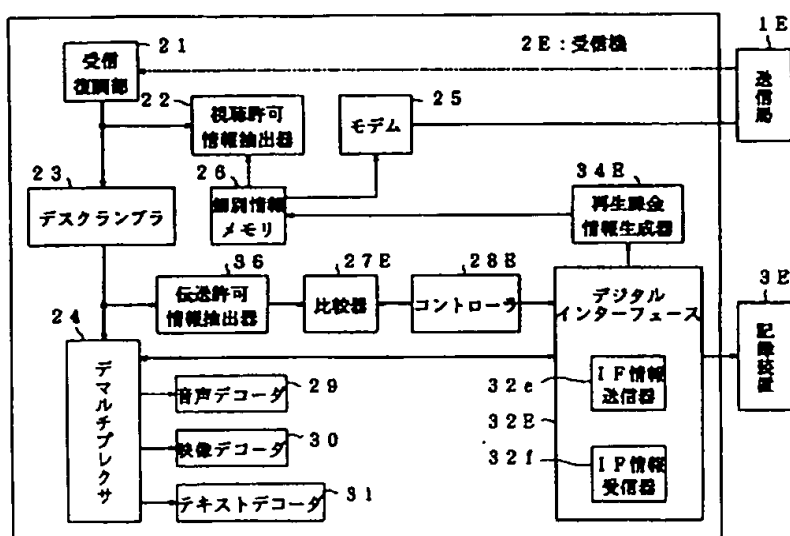


Figure 10

- Key:
- 1E Transmitting station
 - 2E Recorder
 - 3E Recorder
 - 21 Receiving/demodulating unit
 - 22 Viewing/listening permission information extractor
 - 23 Descrambler
 - 24 Demultiplexer
 - 25 Modem
 - 26 Individual information memory
 - 27E Comparator
 - 28E Controller
 - 29 Audio decoder
 - 30 Video decoder
 - 31 Text decoder
 - 32E Digital interface
 - 32e IF information transmitter
 - 32f IF information receiver
 - 34E Reproduction fee information generator
 - 36 Transmission permission information extractor

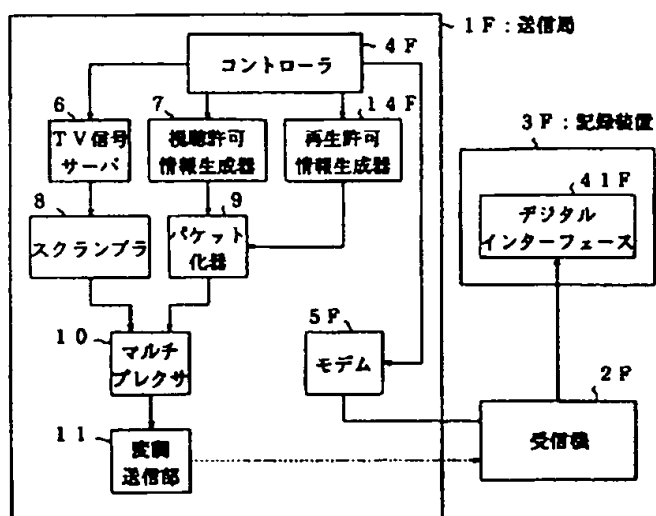


Figure 11

- Key:
- 1F Transmitting station
 - 2F Recorder
 - 3F Recorder
 - 4F Controller
 - 5F Modem
 - 6 TV signal server
 - 7 Viewing/listening permission information generator
 - 8 Scrambler
 - 9 Packet forming unit
 - 10 Multiplexer
 - 11 Modulating/transmitting unit
 - 14F Reproduction permission information generator
 - 41F Digital interface

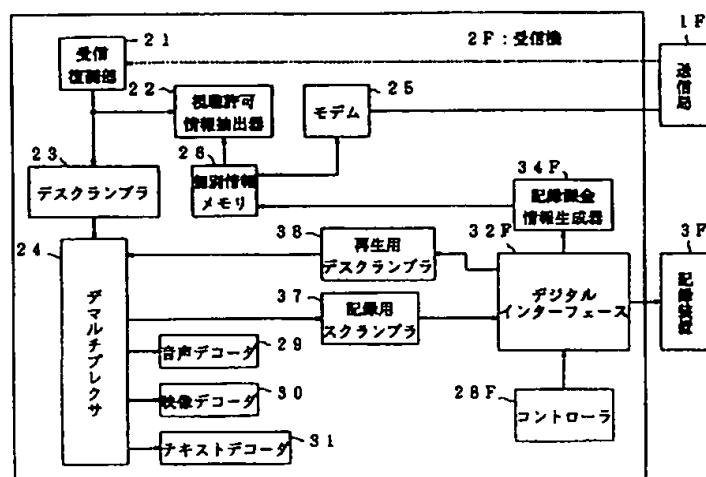


Figure 12

- Key:
- 1F Transmitting station
 - 2F Recorder
 - 3F Recorder
 - 21 Receiving/demodulating unit
 - 22 Viewing/listening permission information extractor
 - 23 Descrambler
 - 24 Demultiplexer
 - 25 Modem
 - 26 Individual information memory
 - 28F Controller
 - 29 Audio decoder
 - 30 Video decoder
 - 31 Text decoder
 - 32F Digital interface
 - 34F Recording fee information generator
 - 37 Scrambler for recording
 - 38 Scrambler for reproduction

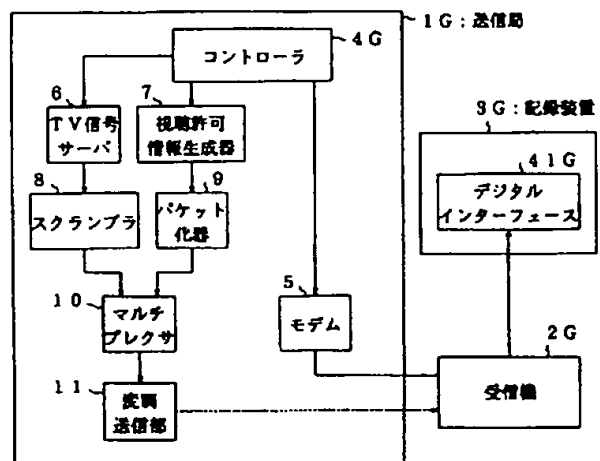


Figure 13

- Key:
- 1G Transmitting station
 - 2G Recorder
 - 3G Recorder
 - 4G Controller
 - 5 Modem
 - 6 TV signal server
 - 7 Viewing/listening permission information generator
 - 8 Scrambler
 - 9 Packet forming unit
 - 10 Multiplexer
 - 11 Modulating/transmitting unit

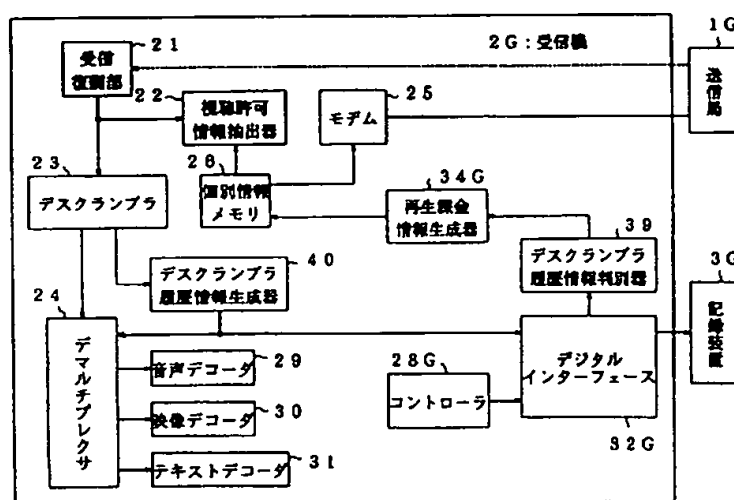


Figure 14

- Key:
- | | |
|-----|--|
| 1G | Transmitting station |
| 2G | Recorder |
| 3G | Recorder |
| 21 | Receiving/demodulating unit |
| 22 | Viewing/listening permission information extractor |
| 23 | Descrambler |
| 24 | Demultiplexer |
| 25 | Modem |
| 26 | Individual information memory |
| 28G | Controller |
| 29 | Audio decoder |
| 30 | Video decoder |
| 31 | Text decoder |
| 32G | Digital interface |
| 34G | Reproduction fee information generator |
| 39 | Descrambler history evaluator |
| 40 | Descrambler history generator |

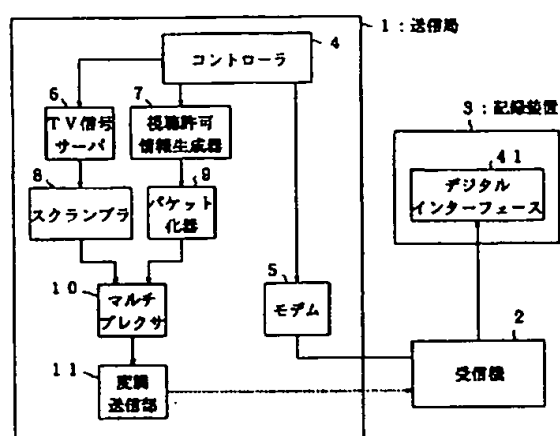


Figure 15

- Key:
- | | |
|----|--|
| 1 | Transmitting station |
| 2 | Recorder |
| 3 | Recorder |
| 4 | Controller |
| 5 | Modem |
| 6 | TV signal server |
| 7 | Viewing/listening permission information generator |
| 8 | Scrambler |
| 9 | Packet forming unit |
| 10 | Multiplexer |
| 11 | Modulating/transmitting unit |
| 41 | Digital interface |

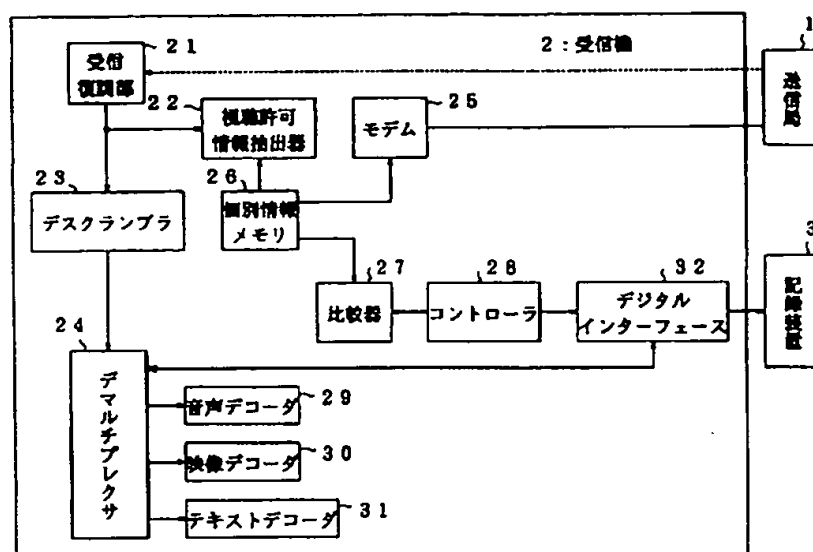


Figure 16

- Key:
- 1 Transmitting station
 - 2 Recorder
 - 3 Recorder
 - 21 Receiving/demodulating unit
 - 22 Viewing/listening permission information extractor
 - 23 Descrambler
 - 24 Demultiplexer
 - 25 Modem
 - 26 Individual information memory
 - 27 Comparator
 - 28 Controller
 - 32 Digital interface